Integrated Avionics System (IAS), Integrating 3D technology On A Spacecraft Panel

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ABSTRACT

As spacecraft designs converge toward miniaturization and with the volumetric and mass placed on avionics, programs will continue to advance the "state of the art" in spacecraft system development with new challenges to reduce power, mass and volume. Although new technologies have improved packaging densities, a total system packaging architecture is required that not only reduces spacecraft volume and mass budgets, but increase integration efficiencies, provide modularity and scalability to accommodate multiple missions. With these challenges in mind, a novel packaging approach incorporates solutions that provide broader environmental applications, more flexible system interconnectivity, scalability, and simplified assembly test and integration schemes.

The Integrated Avionics System (IAS) provides for a low-mass, modular distributed or centralized packaging architecture which combines ridged-flex technologies, high-density COTS hardware and a new 3-D Packaging mechanical packaging approach, a Horizontal Mounted Cube (HMC). The HMC implements a packaging architecture that allows for system modularity and scalability by orientating frames, termed slices, mounted horizontally as opposed to the traditional vertical mounting. This modular subsystem packaging approach maintains its scalability by capturing the adjacent slice using a unique guide pin retention design, thus eliminating disassembly of the entire module. The slice to slice, and slice to Embedded Bus connectivity is maintained using solder-less connections, minimizing traditional harnessing. This rigid flex approach allows for high-speed data transfer with a plug and play cable less approach. This presentation describes the Integrated Avionics System, focus on the interconnection design and the continued progress toward implementing a low cost, Low Mass, common modular packaging architecture adaptable to multi-missions, and provide for an approach that can evolve toward System Spacecraft on a chip.